From the previous demonstration we have

$$f_n = 2m\omega v \sin A \sin \varphi.$$
$$f_e = 2m\omega v \cos A \sin \varphi.$$

These deflective forces are shown in the diagram, also their resultant deflection f, the value of which must be

$$f = \frac{f_n}{\sin A} = 2m\omega v \sin \varphi. \quad (1)$$

or

$$f = \frac{f_e}{\cos A} = 2m\omega v \sin \varphi.$$

Viewed in this manner the deflective influence on any moving body may be regarded as compounded of an effect for motion in the meridian, which we have found accelerates or retards the angular velocity of the moving body, and another effect for motion on a parallel of latitude which changes the direction of motion without affecting velocity.

A little examination will show that the deflective action must be to the right in the Northern and to the left in the Southern Hemisphere.

How gravity acts to accelerate the eastward motion of the body is clearly shown in the lower part of figure 2. As the body moves northward it moves spirally inward towards the axis of the earth. The action of gravity in this direction is inclined to the path and one component of this force, t, accelerates the motion, while the other, f, neutralizes the "centrifugal" tendency, that is, keeps the body from flying off on a tangent.

To compute numerical values of forces by equation (1) the proper units must be employed. There is practically only one unit of force in scientific use, namely, the dyne. In order that the equation may give the force in dynes, it is necessary simply that v be measured in centimeters per second and that the angular velocity of the earth, ω, be expressed in angular amount of motion per second. The earth makes a complete rotation in one siderial day, that is, in 86,164 ordinary seconds. Since the whole circumference is 2π,

$$\omega = \frac{2\pi}{86{,}164}.$$

Since high wind velocities expressed in centimeters per second are inconveniently large numbers, some may prefer to express v in miles per hour. The equation then becomes:

$$f_{\text{dynes}} = 0.006520m\, v_m \sin \varphi.$$

CAUSE OF "SMOKE" FROM MOUNT HOOD.

By FLOYD D. YOUNG, Assistant Observer.

[Dated: Weather Bureau, Portland, Oreg., Nov. 9, 1915.]

The Portland "Oregonian" of October 21, 1915, published the following:

MOUNT HOOD SEEN TO SMOKE—PECULIAR PHENOMENON OBSERVED BY RESIDENTS OF THE DALLES.

(Special.)

THE DALLES, OREG., *October 20.*

Groups of citizens here this afternoon, about 5 o'clock, watched for many minutes a circle of smoke which appeared to be issuing from the vicinity of the crater of Mount Hood, 1,000 feet below the summit.

It was smoke from the crater or a most peculiar atmospheric condition never before seen at that point on the mountain. Before nightfall all the town was interested, as the stories of the various groups of witnesses became noised about. Many old residents were among the watchers.

This is the latest of a long series of such reports sent in at intervals from various towns in the vicinity of Mount Hood; hardly a year of the last decade has passed without the so-called smoke being seen from some locality. This report, like its predecessors, was telegraphed by the news syndicates to all parts of the United States and like its predecessors, it evoked a great deal of discussion and denial from geologists. Probably this latest story gained more credence than the ones of former years, on account of the late activity of Mount Lassen in California.

Geologists unite in saying that the mountain has not been active since the earth became inhabited and that the danger of an eruption at this time is inconsiderable. Instead of being a potential source of evil, a dormant volcano ready at any time to burst forth and overwhelm the surrounding country, Mount Hood is really one of the great natural resources of the State of Oregon. It acts as a great reservoir, storing up water in the form of snow all through the winter and gradually giving it up through the dry summer months, so that the water stages of the four rivers that have their origin at its base vary but little throughout the year. In the Hood River Valley there is a saying, "The warmer the day, the more water for irrigation." The great glacier that brings Hood River into being advances down the mountain side during the winter months and gradually retreats before the summer sun. On some summer days the temperature at the foot of this ice field reaches 85°F. and over, and the rapid melting of the ice is made evident by the continual clatter of the bowlders as they roll down the long steep terminal moraine. Were it not for the melting snows of Mount Hood many streams now used for water power would be practically dry in summer and the city of Portland, Oreg., would be forced to look elsewhere for its water supply.

There is no doubt that the observers who saw the mountain "smoking" were sincere in their statements, for the phenomenon is not unusual. There are three kinds of "smoke" that rise from the top of Mount Hood and all three are dependent on meteorological conditions and on the peculiar topography of the mountain top. Evidently at one time a high inward-facing cliff extended in a complete circle around the summit, forming the walls of the crater. The southern and eastern segments of this circle have disappeared, leaving a semicircular wall of rock facing west and north. (See figs. 1 and 2.) When loose dry snow is present below the cliffs inside the crater rim, a strong wind blowing from the south or east will sweep it to the middle of the arc and there throw it high into the air.

A case of this kind was witnessed by the writer from Portland on October 25, 1915. The sun was rather low in the west and was locally obscured by clouds, but it shone full on the mountain and brought it out in bold relief against the sky. A thin plume of white was rising from the top of the peak to a considerable height, and then curling off toward the north. It was so plain as to be unmistakable, wavering in the wind, now rising, now falling, until it finally disappeared entirely. From the time it was first seen until it disappeared was about four minutes, but it is not known how long the "smoke" had been rising before it was seen. That the wind was blowing from the south was shown by the movement of a few small clouds east of the mountain top and at about the altitude of the summit.

The second type of "smoke" is explained by the great variety of cloud forms that are seen around the mountain at different times. Small clouds have often been seen to drift into the open side of the crater ring and be transformed into an almost perpendicular column of vapor by

To face p. 506.

FIG. 1.—Mount Hood, Oreg., viewed from timber line on the south slope.

FIG. 2.—Mount Hood, viewed from above timber line on the south slope, showing circular cliffs remnant of the crater wall. The rock in the center of the snow field is Crater Rock.

FIG 3.—Summit of Mount Hood, looking down upon the clouds.

FIG. 4.—Strato-cumulus viewed from the southern slope of Mount Hood.

FIG. 5.—View of the top of Mount Hood showing the black rocks within the crater rim.

the rising air currents where the cliffs converge. Cloud banners have been known to hang over the mountain for hours and sometimes whole days at a time, though these clouds do not often have the appearance and form of a smoke column. A comparison between the altitudes of some common cloud forms and that of the summit of the mountain may be made by referring to figures 3 and 4, taken from the summit and from a spot about half-way up the southern slope, respectively.

A third possible explanation of the phenomenon rests on the fact that there are large patches of rock within the crater rim that are hot enough to vaporize any water that may fall on them. In figure 5, the black surface in the foreground is warm enough to keep the snow melted at all times. A hot surface of this kind lies almost directly under the cliffs forming the crater rim, and it is thought that if a snowslide should occur that would throw a large quantity of snow on that spot, the steam generated could be seen some distance. To the writer's knowledge, this has never been actually seen to occur, but the hypothesis seems plausible; and it is likely if ever such a thing really takes place, the snow slides down during the winter months when it is practically impossible to ascend the mountain.

THE MAKING OF FORECASTS BY LAYMEN.

[U. S. Weather Bureau, Washington, October, 1915.]

[The central office recently addressed the following remarks to the Weather Bureau personnel. We reprint them here because of their undoubted interest to the general public. The bureau desires to encourage the development of the art of forecasting and to stimulate the study of the subject throughout the country. So far as it is possible to transfer the forecasters' experience to paper, the Weather Bureau does so from time to time as is shown by the nature of various articles the bureau has published and expects to publish in the future. The following remarks are made solely in the interest of the public.—C. A., jr.]

No doubt many of the officials of the Weather Bureau have, from time to time in the past, aided in giving currency to the idea that every man can be his own forecaster. In a certain sense this becomes possible if there is some familiarity with the source of weather forecasting and if a weather map of recent date is available.

In view of the difficulties of accurate forecasting in the long run, however, it seems desirable not to encourage a too literal acceptance of the idea in question. Especially is this the case where the impression exists on the part of horticulturists, business men, and others who may have important interests at stake in connection with forthcoming weather conditions, that their own ability to forecast the coming weather is sufficient for their guidance in the conduct of their business or agricultural affairs.

The reasons for the caution here advanced, and which should be conveyed to those inclined to depend too largely on their own knowledge of the weather map, should be sufficiently obvious to the members of the Weather Bureau. Experience has already fully demonstrated that, while the recognized principles of weather forecasting are common property in so far as concerns the fact that they have been set forth in numerous publications, very few even among those who give their daily attention to the subject have developed exceptional skill in making the forecasts. Furthermore, the weather maps as issued—which must necessarily be the sole basis of an individual forecast—do not contain all of the information that has passed under the scrutiny of the official forecaster before he issues the forecasts and warnings. Not only at the district forecast centers, but to a larger extent at the Washington office, there are prepared supplementary charts covering the changes in pressure and temperature within a given preceding period, etc., which play their part in the final determination of the forecast issued.

It will thus be readily seen that, whatever may be the justification for an individual to attempt to make his own deductions from the weather map with reference to his particular interests, it will be much better for him to place his reliance upon the official forecasts and information issued by the Weather Bureau. These considerations justify the Weather Bureau in discouraging the idea that satisfactory forecasts can be made by anyone merely because he possesses a fair knowledge of meteorological laws.—*C. F. Marvin, Chief of Bureau.*

PROFESSOR CLEVELAND ABBE.

[U. S. Weather Bureau, Washington, D. C., Dec. 3, 1915.]

The news that Professor Cleveland Abbe has been under the necessity of taking an extended leave of absence on account of ill health will be received with regret not only by his coworkers in the Weather Bureau, but throughout the scientific world.

Professor Abbe [who is now just 77] has had 44 years of distinguished service in the Weather Service and Weather Bureau of the Government. Through his exexcellent work and eminence in the application of meteorology he has come to be regarded as the "dean of the Weather Service." During this period he has been indefatigable in the pursuit of his favorite branch of science, while his enthusiasm served to enlist the interest of a number of young students who later made their mark in the development of meteorology as a science.

Professor Abbe's long and able editorship of the MONTHLY WEATHER REVIEW and his numerous contributions to meteorological science are well known to the members of the Weather Bureau, as well as to meteorologists the world over, all of whom will wish for him a complete recovery and an early return to the congenial duties in which he has been engaged for so many years.

The above was recently communicated to the personnel of the Weather Bureau, but is also of interest to other readers of the REVIEW.—C. A., jr.

PENNSYLVANIA WEATHER AND CLIMATE IN 1682.

William Penn, founder of the State of Pennsylvania, first trod the soil of the land on the Delaware, granted him by Charles II of Britain, on October 28, 1682. Before this time he had actively agitated the advantages of country life and of emigration to the New World, had drafted a form of government for his colony, and had actually sold as much as 600,000 acres of his grant to prospective settlers. Numerous settlers had preceded Penn, a multitude accompanied and immediately followed him; and by the time he wrote the *Letter* quoted below, settlements dotted the rivers several miles inland. Along the Delaware River settlements reached from Lewes to above the Falls at Trenton, and shortly before writing the *Letter* Penn had made a general tour of his lands so that he had freshly in mind full information from his own observations.

The original draft of the *Letter* is preserved by the Historical Society of Pennsylvania. Published versions